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ABSTRACT

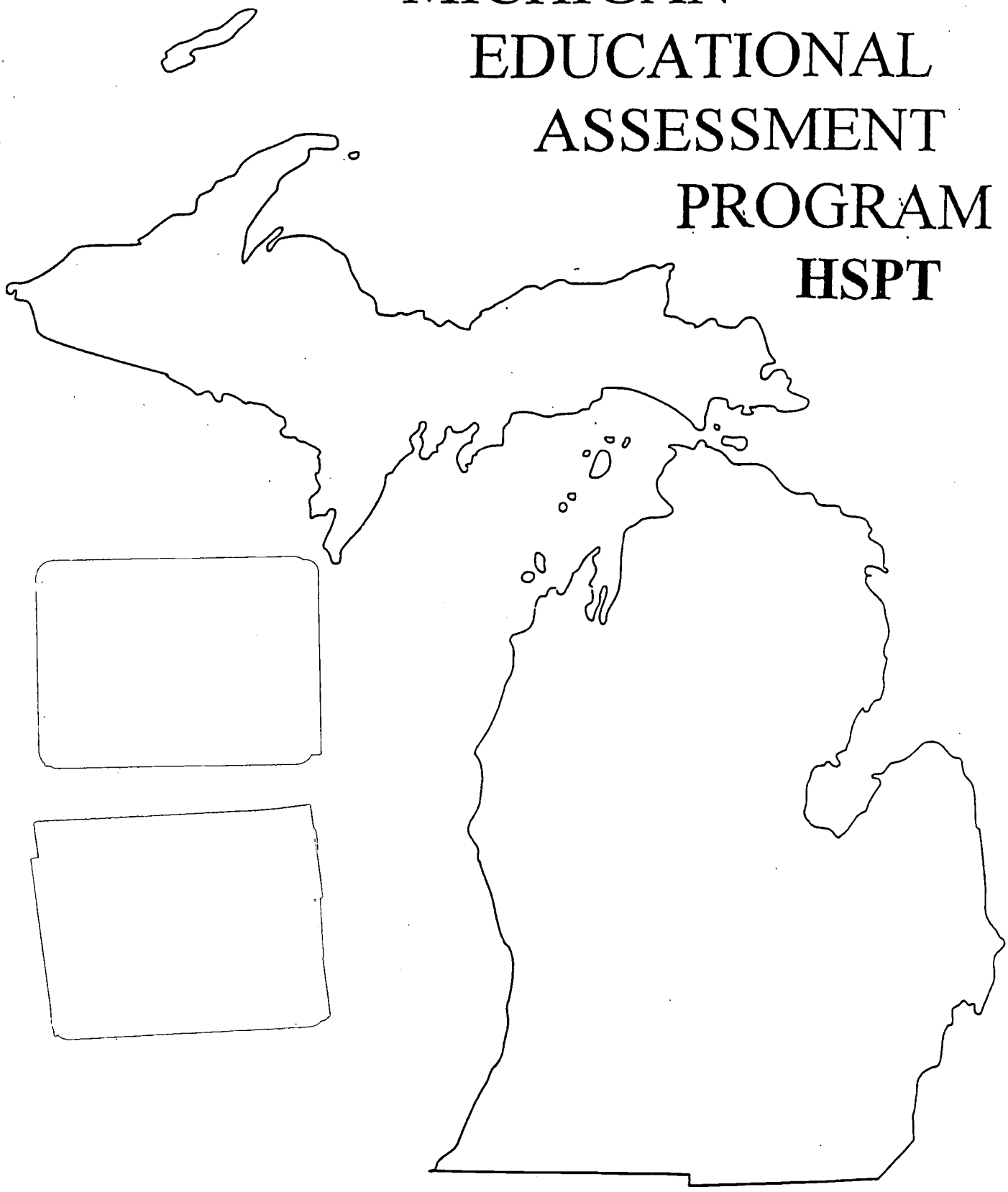
As part of the test development process, this document provides the released mathematics items and student responses to some questions from the Michigan High School Proficiency Test (HSPT) in mathematics. This packet is designed for teachers and students who are interested in understanding how the open-ended items from the HSPT in Mathematics are scored. The packet contains the Mathematics Scoring Guides for item #26 from the Spring 1996 administration and item #23 from the Winter 1997 administration. The guides include the test question, the scoring guide (or rubric), exemplary answers and annotated student papers which demonstrate how the items are scored. Also included are four multiple-choice items which were released from the Spring 1996 test. (ASK)

Michigan High School Proficiency Test (HSPT) Released Items for Mathematics

Michigan State Department of Education

MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM

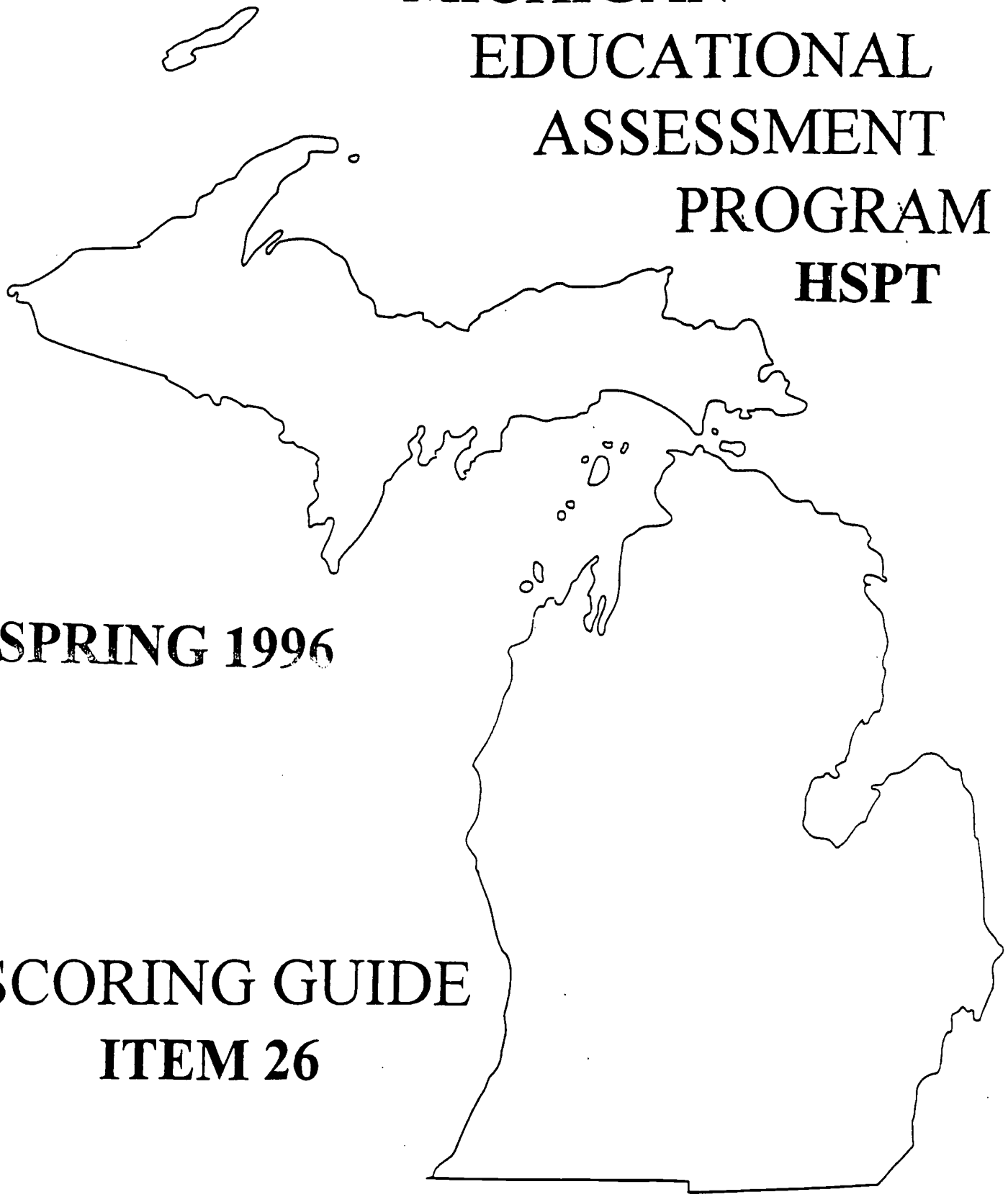
HSPT



MATHEMATICS

MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM

HSPT



SPRING 1996

SCORING GUIDE

ITEM 26

MATHEMATICS

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

RETURN TO PAGE 14 IN THE TEST BOOKLET

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.

STICK1	STICK2	STICK3	Δ's
2	3	4	*
2	3	5	
2	3	6	
2	4	5	*
2	4	6	
2	5	6	*
3	4	5	*
3	4	6	*
3	5	6	*
4	5	6	*

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

$\frac{7}{10}$

7 out of 10

70%

TOTAL POINT VALUE: 4

PART A (2 points)

2 Table showing all 10 choices

1 Table showing at least 7 of the 10 choices

0 Other

PART B (1 point)

1 Indicates <u>all</u> possible choices from table in Part A

0 Other

PART C (1 point)

1 Correct probability

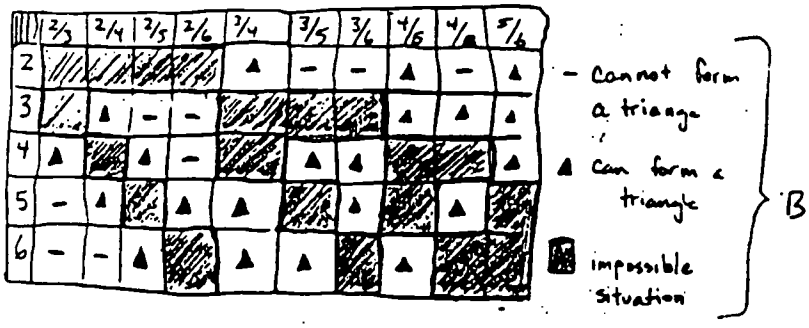
0 Other

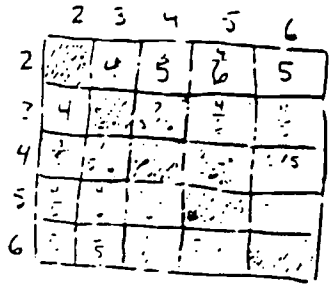
NOTE: Score Part C as correct if answer is <u>clearly</u> based on incomplete answers from Parts A and B.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.





B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

10 possibilities
7 get triangles

70% probability that drawning three sticks from the bag that they will form a triangle

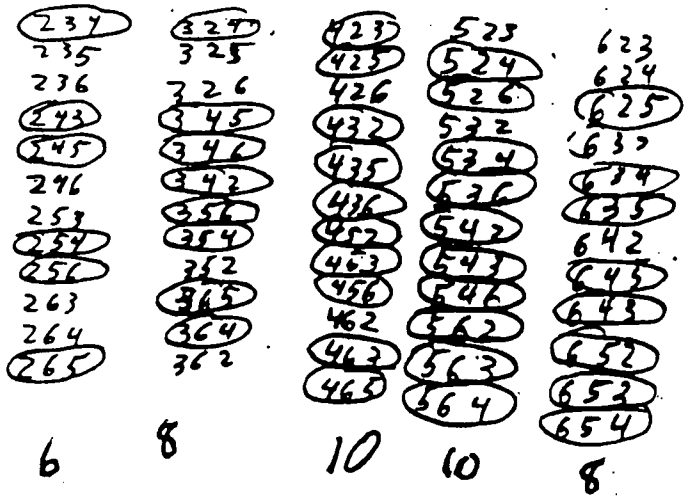
SCORE POINT: 4

The table in Part A does show <u>all</u> 10 choices. The 7 possible choices are indicated in the table for Part B, and the probability given in Part C is correct based on the student's answers from Parts A and B.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.



B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

To check ones will form triangle

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

$\frac{42}{60}$ or 70% probability

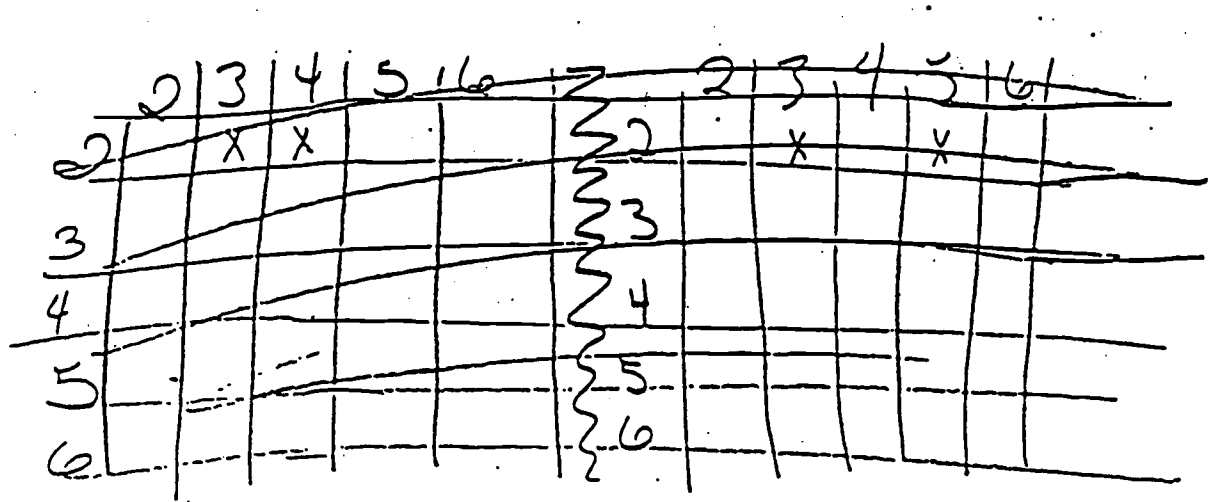
that 3 stick drawn at Random will form a triangle

SCORE POINT: 4

The table shows all 10 choices for Part A. The choices have been repeated to make a total of 60. The student did indicate the correct 7 possible choices for Part B. Again, the possible choices have been repeated. The probability is correct for Part C.

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.



2 3 4 3 4 5 4 5 6
2 3 5 3 4 6
2 3 6 3 5 6
2 4 5
2 4 6
2 5 6

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

5 4 3

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

1/10

SCORE POINT: 3

For Part A, the table does show **all** 10 choices. The response to Part B **does not** indicate **all** possible choices from the table in Part A. "1/10" is the correct probability based on answers from Parts A and B.

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.

1. 2,3,4 ---> 4,5,2
2. 2,3,5 8. 4,5,3
3. 2,3,6 9. 5,6,2
4. 3,4,5 10. 5,6,3
5. 3,4,6 11. 6,2,4
6. 4,5,6

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

4,5,6 -2,3,4-2,4,6.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

3/11

SCORE POINT: 3

For Part A, the table does show **all** 10 choices (3,4,5 and 4,5,3 are the same). The response to Part B does not indicate **all** possible choices from the table in Part A. The probability "3/11" for Part C is **clearly** based on the answers from Parts A and B.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle..

A Contruct a table showing all the possible choices of selecting three sticks.

sticks picked up

236
246
234-Δ
245-Δ
256-Δ
324-Δ
345-Δ
325.
326
346-Δ
456-Δ
452-Δ
453-Δ
426
463-Δ

Δ: ABLE TO MAKE A Triangle

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

234, 245, 256, 324, 345, 346, 456, 452, 453, 463

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

$\frac{10}{15} = \frac{2}{3}$ of the time

SCORE POINT: 3

The response to Part A shows 9 of the 10 choices. The choice "3 5 6" is missing. In Part B, the student does indicate all possible choices from the table in Part A. The probability is correct based on answers from Parts A and B.

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.

(2,3,4)
(2,3,5)
(2,3,6)
(2,4,5)
(2,4,6)
(2,4,3)
(3,2,4)
(3,2,5)
(3,2,6)
(4,5,6)
(4,5,3)
(4,2,5)
(4,3,6)
(5,6,3)
(5,6,2)
(5,4,2)
(5,3,2)
(6,5,3)
(6,5,2)
(6,5,4)

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

There isn't a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

There isn't a triangle.

SCORE POINT: 2

The table does show all 10 choices.

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.

Yes X 234 235 236
Yes X 345 346 342
Yes X 456 452
562 563

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

3/10

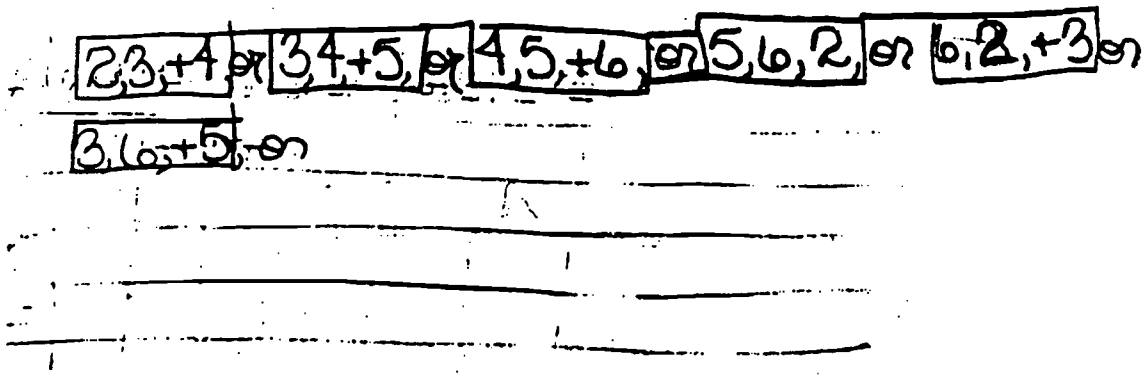
SCORE POINT: 2

The response to Part A shows only 9 choices (234 and 342 are the same). For Part B, the student does not indicate all of the possible choices from the table in Part A. In Part C, the probability "3/10" is clearly based on the answers from Parts A and B.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.



B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

all of them except (6,2+3)

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

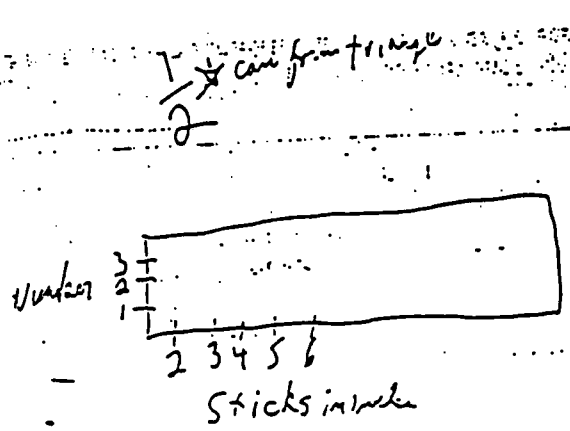
83% chance of making a triangle

SCORE POINT: 2

Only 6 choices are shown in Part A, so no credit is given. The student indicates **all** possible choice from the table so one point is received for Part B. The probability for Part C is correct (5 possible out of 6 choices is 83%) and is **clearly** based on answers for Parts A and B.

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Construct a table showing all the possible choices of selecting three sticks.



234
245
256
324
345
356
423
435
456
523
534

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

80%

SCORE POINT: 1

The table shows 7 possible choices in Part A. The choices that can form a triangle are not indicated so the probability "80%" for Part C is not **clearly** based on answers to Parts A and B.

STOP

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.

Pick	inches choosen
1	2, 3, 4
2	2, 5, 6
3	3, 4, 5
4	3, 6, 2
5	4, 5, 6
6	4, 3, 2
7	5, 6, 2
8.	5, 3, 4
9	6, 2, 3
10	6, 4, 5

10 possibilities

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

4, 5, 6

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag? 1 in 10 possibilities. That a triangle can be formed when 3 sticks are drawn

SCORE POINT: 1

The table in Part A shows only 5 choices. "Pick" 6-10 are actually the same choices made in "Pick" 1-5. The response to Part B does not indicate **all** possible choices shown in Part A. The probability given in Part C is the correct probability **clearly** based on answers from Parts A and B.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.

Possible choices	
2	3,4,5,6
3	2,4,5,6
4	2,3,5,6
5	2,3,4,6
6	2,3,4,5

As you can see in the chart, if you choose three sticks your odds of choosing the one you want is very slim. For example: If you pick a 3 the first time, you will either pick a 2,4,5 or 6 the second time and so on with all sticks

Sticks that can form a triangle are 2, 3 and 4. They are the only three choices that it will form.

B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

The probability that a triangle can be formed when three sticks are drawn at random from the bag is 9 : 25.

Out of every 25 times you try to form a triangle, the probability of actually forming one is only 9

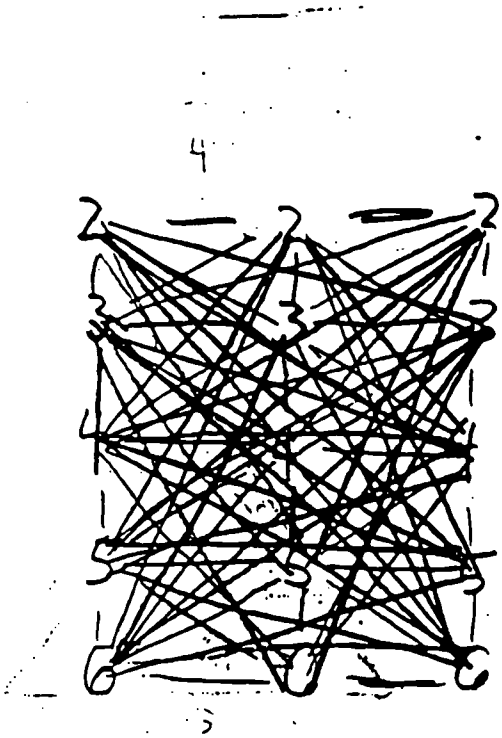
SCORE POINT: 0

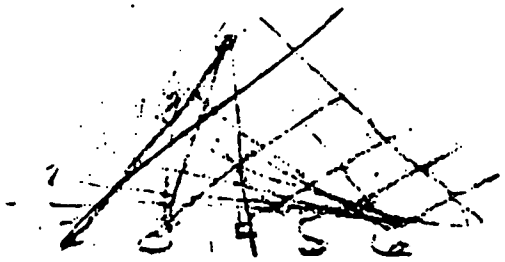
The response to Part A shows less than 7 choices and the response to Part C is not **clearly** based on the answer to Part A.

(4 Points)

26 A bag contains five sticks with lengths of 2, 3, 4, 5, and 6 inches. Suppose you pick three of the sticks randomly to try and form a triangle.

A Contruct a table showing all the possible choices of selecting three sticks.





B Indicate in the table in Part A which of the choices of three sticks can form a triangle.

all equalateral

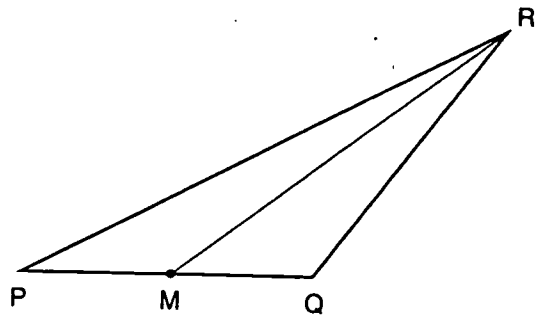
C What is the probability a triangle can be formed when three sticks are drawn at random from the bag?

2/3

SCORE POINT: 0

No clear choices are indicated in Part A.

1 GEOMETRY-MC 703



If M is the midpoint of $\overline{PQ}$, which statement is true about the relationship between triangle PMR and triangle QMR ?

25.9 ✓**A** Their areas are equal.

30.7 **B** They are similar.

35.4 **C** They are congruent.

7.5 **D** Their perimeters are equal.

2 NUMBERS-MC 031

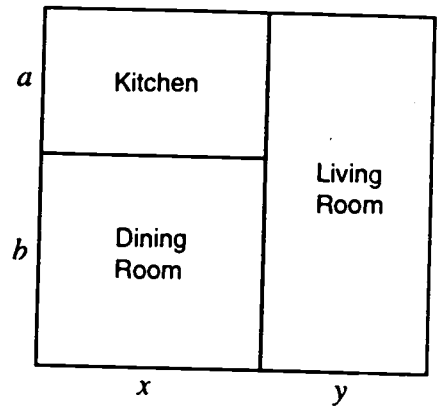
Victor receives $5 every 2 weeks as his allowance. He pays $2.50 every 3 weeks for a membership in a CD club. If he saves the rest of his money, how much money will he have at the end of 6 weeks?

4.5 **A** $5 ✓**B** $10 75.9

10.5 **C** $15 **D** $25 8.7

3 ALGEBRA-MC 431

Which expression represents the area of the living room below?



8.5 **A** $(y-x)(a+b)$ ✓**B** $y(a+b)$ 59.3

26.8 **C** $(x+y)(a+b)$ **D** $y(b-a)$ 4.5

4 DATA ANALYSIS-MC 277

The students in an economics class made the following table to show the number of radios their families own.

Number of Radios	Number of Students Responding
3 or more	4
2	15
1	12
0	1

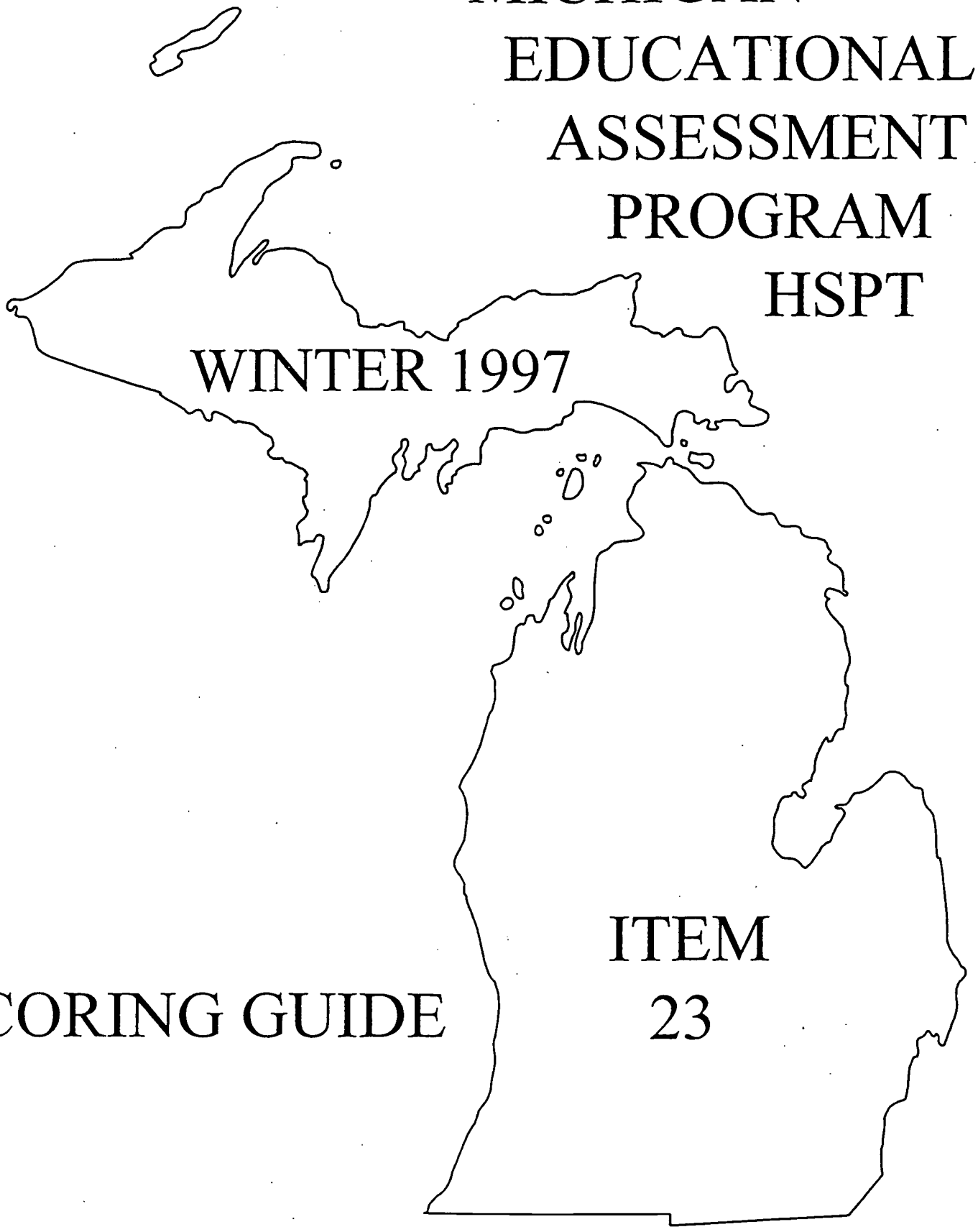
What is the probability a student selected at random will be in a family owning 2 or more radios?

9.4 **A** $\frac{4}{32}$ **B** $\frac{13}{32}$ 4.5

22.9 **C** $\frac{15}{32}$ ✓**D** $\frac{19}{32}$ 62.3

MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM HSPT

WINTER 1997



SCORING GUIDE

ITEM 23

MATH PART 1

How to Use the Released Mathematics Item
Winter 1997

The attached item can be used with teachers, students, parents, and anyone else who is interested in the mathematics items on the High School Proficiency Test.

The open-ended items are designed to assess student's problem solving and reasoning skills, in this particular case, in geometry and measurement. The objective tested is "Use both traditional and metric measures of length, angle, perimeter, area (including surface area), volume, capacity, weight, time and temperature to solve problems."

This released item, along with the one released in 1996, illustrate for teachers and students how the items are scored. This set of actual student answers is used in the training of the scorers to illustrate the different score points possible. This item is scored similarly to all open-ended itemson the HSPT. Students can get partial credit for incomplete answers, provided they have a good start. Each part of the problem is scored separately, so a student who does not receive any credit in part a could get credit in part b if they apply a correct conversion.

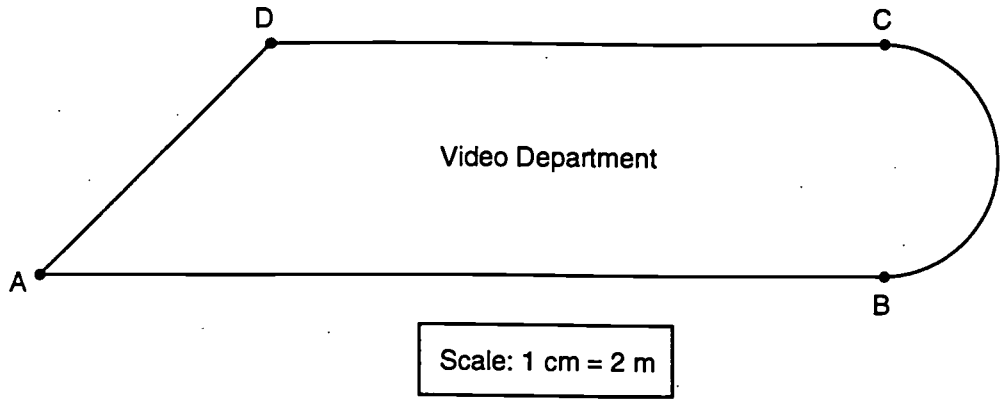
In using the released item, students and teachers should determine what is being asked of students: the depth of thinking needed, the connections that need to be made, the contexts in which the items are placed, and the data they are asked to analyze. Then examine where this type of thinking is developed in your school's curriculum. Are student reading carefully, following directions, completing all steps in this type of problem in their regular school work? Do they have misconceptions about geometry and measurement terms? Examine the amount of written work required on this item for a correct answer. How much detail is needed, how extensive do the explanations have to be? Students need to write out the formulas they are using, attempt the question, and write down what they do know, even if it is not the whole answer. They need to re-read the question and make sure they have answered every part.

Focusing exclusively on the skills shown here will not help students. These exact skills may or may not be tested on the HSPT again. Focusing on the strand, the types of general misconceptions seen, general problem solving skills, and types of acceptable responses on the written portion of the test will help students.

Using open-ended items and rubrics in your classroom will prepare students for what they need to do. Providing multiple opportunities for students to do these types of questions will help with the HSPT.

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.

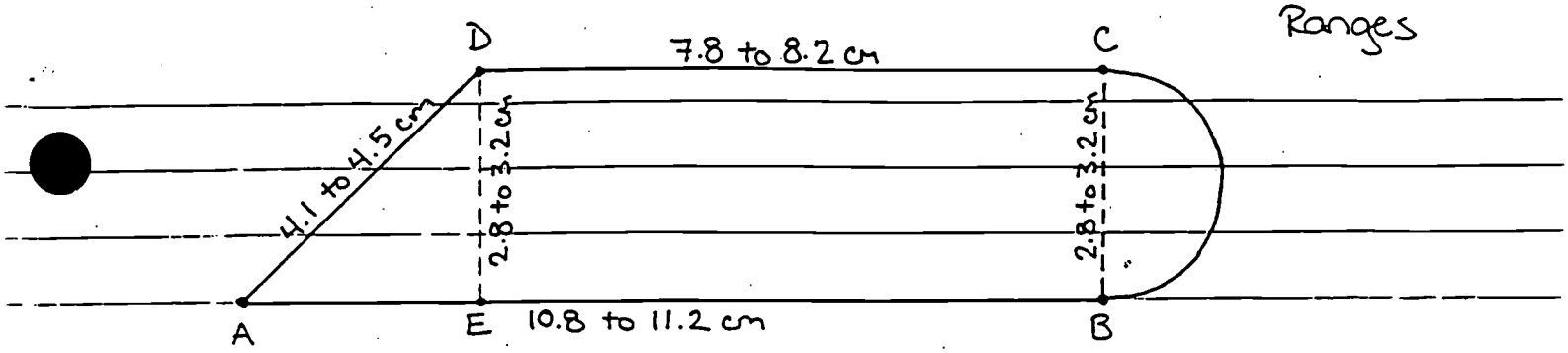


A Compute the area of the entire scale model drawing to the nearest **cm²**. Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

B Using the scale in the diagram above, what is the area of the actual video department to the nearest **m²**? Provide the work that shows how you arrived at your answer.

STOP

Complete Ranges



A Triangle - Rectangle - Semicircle

Triangle: $\frac{1}{2}bh = 3.92$ to $5.12\ cm^2$

Rectangle: $lw = 21.84$ to $26.24\ cm^2$

Semicircle: $\frac{1}{2}\pi r^2 = 3.08$ to $4.02\ cm^2$ (or $.98\pi$ to 1.28π)

28.84 to $35.38\ cm^2$ (or $25.76 + .98\pi$ to $31.36 + 1.28\pi$)

Trapezoid - Semicircle

Trapezoid: $\frac{1}{2}(b_1+b_2)h = 26.04$ to $31.04\ cm^2$

Semicircle: $\frac{1}{2}\pi r^2 = 3.08$ to $4.02\ cm^2$ (or $.98\pi$ to 1.28π)

31.40 to $35.04\ cm^2$ (or $26.04 + .98\pi$ to $31.04 + 1.28\pi$)

B Total area ranges: 115.36 to $141.52\ m^2$

(or $103.04 + 3.92\pi$ to $125.44 + 5.12\pi$)

Results in Part B can be obtained from the same methods as in Part A or by multiplying the result from Part A by $4\ m^2/cm^2$

Item 23

Total point value: 5

Part A (3 points)

3 Correct total area with work showing a correct method

2 Correct method with incorrect total area due to a computational or measurement error

or

a partially correct method with incorrect total area showing:

- 2 of 3 correct areas when using the triangle-rectangle-semicircle method
- correct trapezoid area when using the trapezoid-semicircle method

1 Correct total area with no work shown

or

a partially correct method with incorrect total area showing:

- 1 of 3 correct areas when using the triangle-rectangle-semicircle method
- correct semicircle area when using the trapezoid-semicircle method

or

a partial setup of a correct method without arriving at a correct total area (or without arriving at any total area)

0 Other

Item 23

Part B (2 points)

2 Correct total area with work showing a correct method

1 Correct total area with no work shown

or

a partially correct method with incorrect total area showing

- 1 of 3 correct areas when using the triangle-rectangle-semicircle method
- 1 of 2 correct areas when using the trapezoid-semicircle method

0 Other

Note:

Score Part B correct if the student correctly uses an incorrect area from Part A.

Score Part B as 0 if the student attempts conversion to m^2 by multiplying the result in Part A by 2.

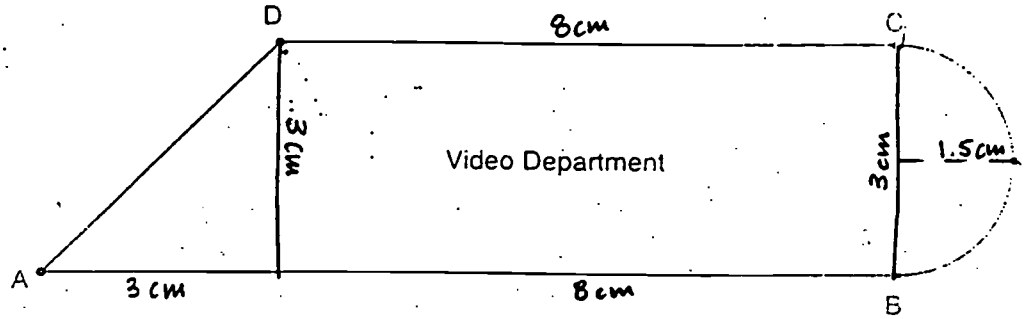
If the student finds the perimeter in Part A and Part B and correctly doubles the measurements of the segments, score Part B as 1.

If the student finds the correct area in m^2 in Part A, give credit in Part A but not in Part B (unless the student converts to cm^2 in Part B).

Students may use the grid on the provided acetate overlay to estimate a correct total area.

(5 Points)

23 A scale model of the video department in a store is shown below. This department is ... 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the ... that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

$A_{TRIANGLE} = \frac{1}{2}bh = \frac{1}{2}(3)(3) = 4.5\ cm^2$

$A_{RECTANGLE} = lw = (8)(3) = 24\ cm^2$

$A_{SEMICIRCLE} = \frac{1}{2}(\pi r^2) = \frac{1}{2}(\pi)(1.5)^2 = 1.125\pi\ cm^2$

$TOTAL = 28.5 + 1.125\pi\ cm^2$

$\approx 32.03429\ cm^2$

B Using the scale in the diagram above, what is the area of the actual video ... the nearest m²? Provide the work that shows how you arrived at your answer.

$1\ cm = 2\ m$

$A_T = \frac{1}{2}(2\cdot3)(2\cdot3) = 18\ m^2$

$A_R = (2\cdot8)(2\cdot3) = 96\ m^2$

$A_S = \frac{1}{2}(\pi)(2\cdot1.5)^2 = 4.5\pi\ m^2$

$TOTAL = 114 + 4.5\pi\ m^2$

$\approx 128.13717\ m^2$

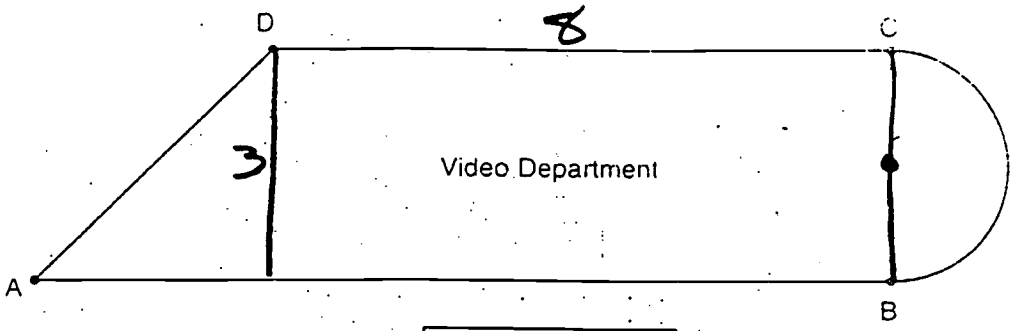
3 points
Part A: Correct total area showing work

2 points
Part B: Correct total area showing work

Total score : 5

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

$A_{RECT} = lw$ $A_{RECT} = 8 \times 3$ $A_{TRI} = \frac{1}{2}bh$

$A_{RECT} = 24 cm^2$ $A_{TRI} = \frac{1}{2}(3)(3)$

$A_{TRI} = 4.5 cm^2$

$A_{CIRCLE} = \pi r^2$ $24 cm^2 + 4.5 cm^2 + 3.5 cm^2 = A$

$A_{SCIRCLE} = \frac{1}{2}\pi r^2$ Diameter = 3 $A = 32 cm^2$

$A_{SCIRCLE} = \frac{1}{2}\pi 2.25 cm^2$ $r = 1.5$ $A_{SCIRCLE} = 3.5 cm^2$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$k = 2m$

$1 cm^2 = 4 m^2$

$\frac{1 cm^2}{4 m^2} = \frac{32 cm^2}{x}$ $x(1 cm^2) = (32 cm^2)(4 m^2)$

$128 m^2 = x$

STOP

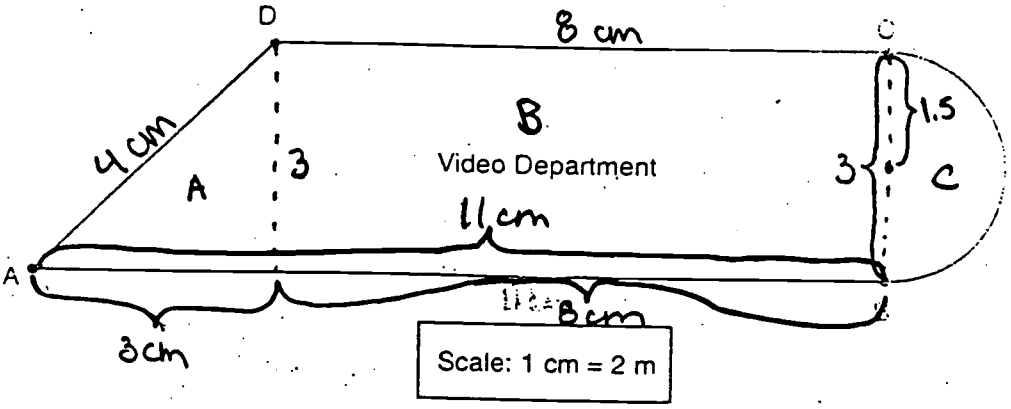
3 points
Part A: Correct total area showing work

2 points
Part B: Correct total area showing work
This student chose to convert directly from cm^2 to m^2 by multiplying cm^2 by 4. This avoids repeating the more complicated calculations in part A.

Total score : 5

(5 Points)

23 A scale model of the video department in a store is shown below. This department consists of 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

$T_m = A_m + B_m + C_m$

$\frac{1}{2} b_m h_m = A_m$

$L_m W_m = B_m$

$\frac{1}{2}\pi r_m^2 = C_m$

$b_m = B$

$h_m = 3$

$L_m = 8$

$W_m = 3 \quad r_m = 1.5$

$A_m = \frac{1}{2}(8)(3)$

$A_m = 4.5$

$B_m = 8(3)$

$B_m = 24$

$C_m = \frac{1}{2}\pi(1.5)^2$

$C_m = 1.125\pi$

$T_m = 4.5 + 24 + 1.125\pi$

$T_m = 28.5\,cm^2 + 1.125\pi\,cm^2$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$T_A = A_A + B_A + C_A$

$\frac{1}{2} b_A h_A = A_A$

$L_A W_A = B_A$

$\frac{1}{2}\pi r_A^2 = C_A$

$b_A = 2b_m$

$h_A = 2h_m$

$L_A = 2L_m$

$W_A = 2W_m \quad r_A = 2r_m$

$A_A = \frac{1}{2}(2 \cdot 3)(2 \cdot 3)$

$A_A = 18$

$B_A = (2 \cdot 8)(2 \cdot 3)$

$B_A = 96$

$C_A = \frac{1}{2}\pi(2 \cdot 1.5)^2$

$C_A = 4.5$

$T_A = 18 + 96 + 4.5\pi$

$T_A = 114\,m^2 + 4.5\pi\,cm^2$

3 points
Part A: Correct total area showing work

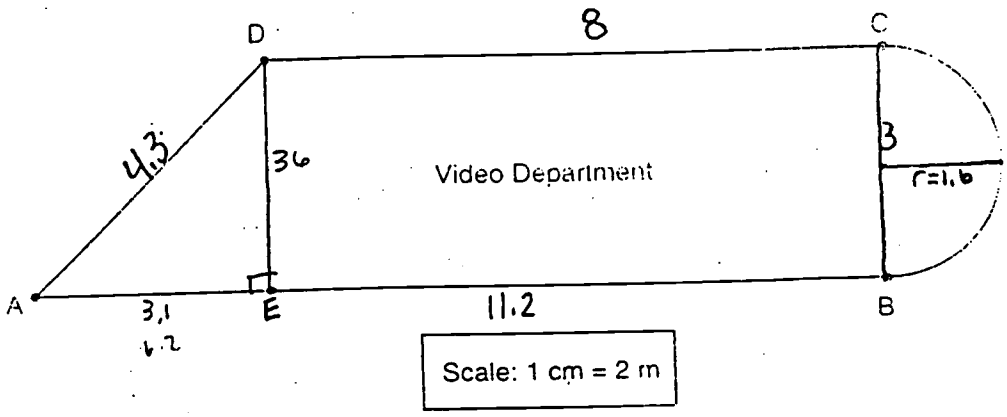
2 points
Part B: Correct total area showing work

Student chooses to leave both answers in terms of π.

Total score : 5

(5 Points)

23 A scale model of the video department in a store is shown below. This department is made up of 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

$\frac{1}{2}(3.1)(3) = 4.65\text{cm}^2 = \triangle ADE$

$8 \cdot 3 = 24\text{cm}^2 = \square DCBE$

$\frac{1}{2}\pi(1.6) \approx 2.5133$

$\approx 31.16\text{cm}^2$

$4.65 + 24 + \frac{1}{2}\pi(1.6) =$

$28.65 + \frac{1}{2}\pi(1.6) =$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$\frac{1}{2}(3.1 \times 2)(3 \times 2)$ $\frac{1}{2}(6.2)(6) = 18.6\text{m}^2$

$(8.2)(3 \times 2)$ $16(6) = 96\text{m}^2$

120m^2

$\frac{1}{2}\pi(1.6 \times 2)$ $\frac{1}{2}\pi(3.2) \approx 5.027$

2 points

Part A: Student divides the figure into a triangle, a rectangle, and a semicircle. The area of the semicircle is incorrect. 2 of 3 correct areas with this method merits 2 points in part A.

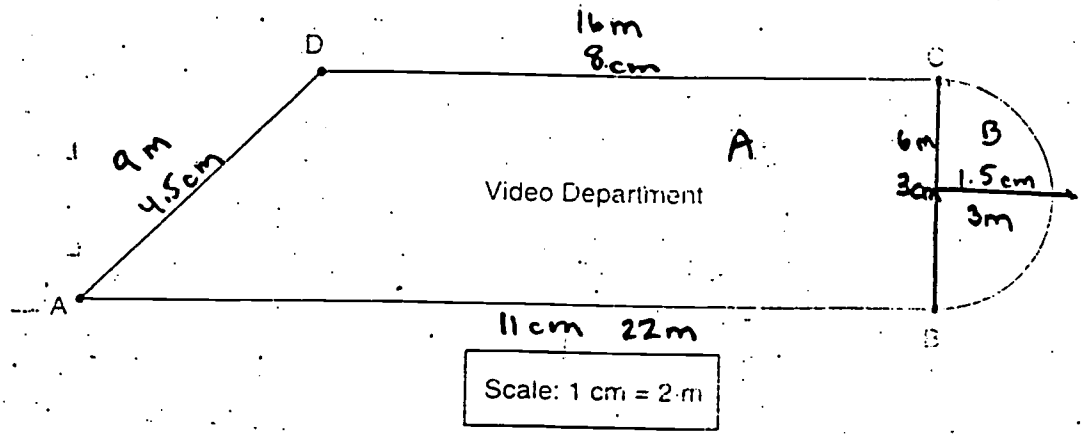
2 points

Part B: Student makes the same mistake here as in part A. Don't punish the student twice for the same mistake! Method for finding area in m^2 using the scale is acceptable.

Total score : 4

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

Trapezoid

$A = \frac{1}{2}(8+11) \times 3$

$A = 28.5\ cm^2$

semicircle

B= $A = \pi r^2$

$A = \pi(1.5)^2$

$\frac{A = 7.07\ cm^2}{2}$

$A = 3.54\ cm^2$

$A+B$ = Total Area

$28.5\ cm^2 + 3.54\ cm^2$

$= 32.04\ cm^2$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$\frac{1}{4.5} = \frac{2}{x}$

A Trapezoid

$A = \frac{1}{2}(16+11) \times 6$

$A = 40.5\ m^2$

$A + B$ = Total Area

$40.5\ m^2 + 14.14\ m^2 =$

$= 54.64\ m^2$

Semicircle

B= $A = \pi r^2$

$A = \pi(3)^2$

$A = 9\pi$

$\frac{A = 28.27\ m^2}{2}$

$14.14\ m^2$

STOP

3 points

Part A: Correct total area showing work. Student divides figure into a trapezoid and a semicircle. Student correctly applies the formula for the area of a trapezoid.

1 point

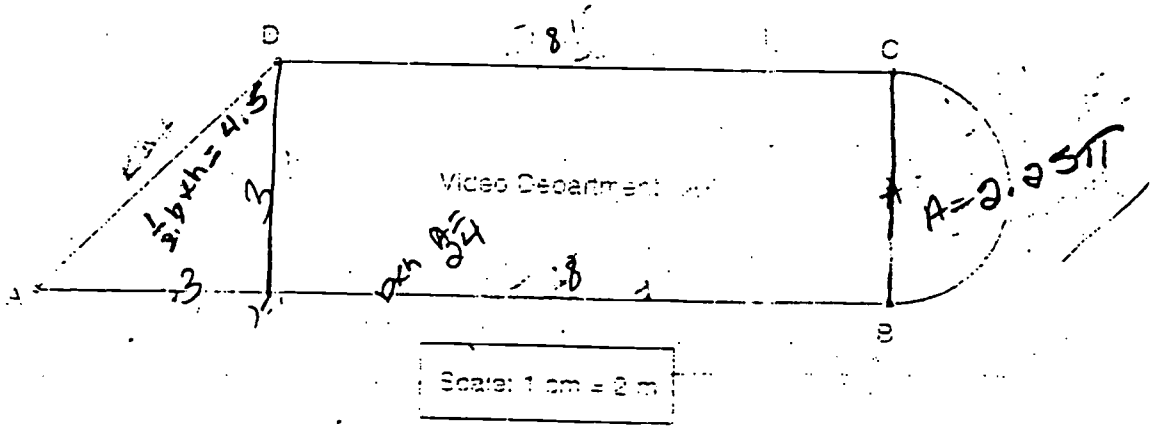
Part B: Student uses the same method as in part A but makes a mistake by not doubling 11 in the formula.

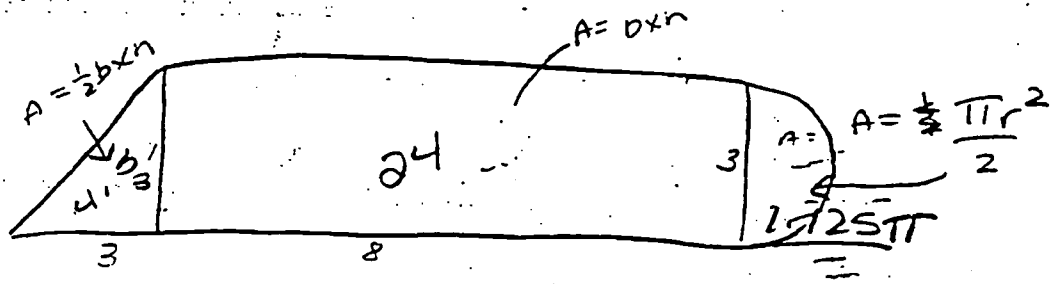
Total score : 4

G6

(5 Points)

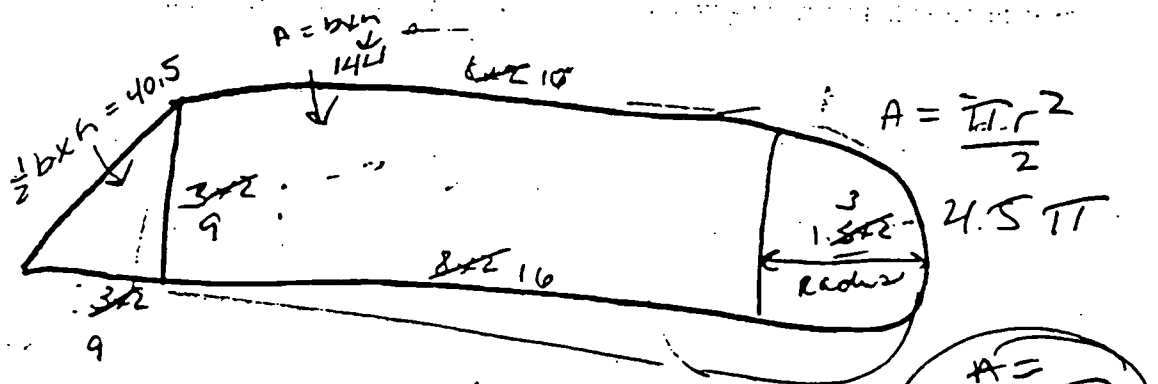
23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.





4.5 + 24 + 1.125π =

29.625π cm²



40.5 + 144 + 4.5π = 189π m²

STOP

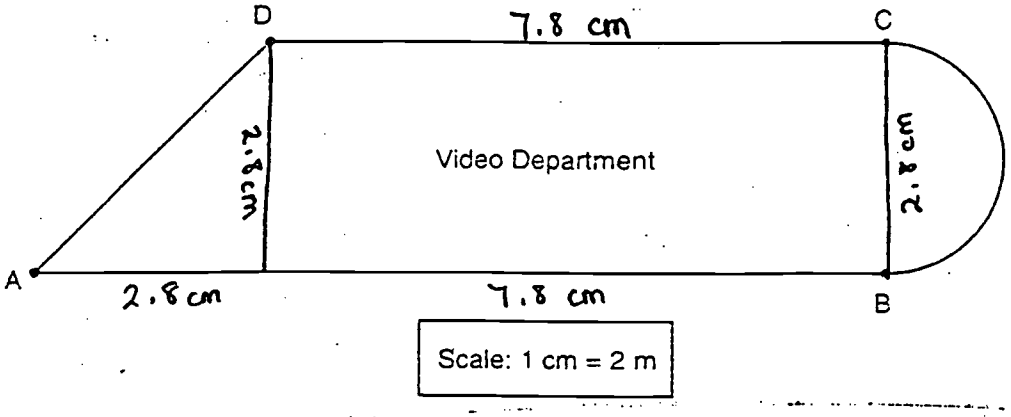
2 points
Part A: Incorrect total area. All three smaller areas are correct, but student attempts to combine unlike terms to find total area.

1 point
Part B: Area of semicircle is correct. Rectangle and triangle areas are incorrect. Student again attempts to combine unlike terms.

Total score : 3

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

A of Δ = ½bh
A of Δ = ½(2.8)(2.8)
A of Δ = 3.92 cm²

A of □ = bh
A of □ = (7.8)(2.8)
A of □ = 21.84 cm²

A of ○ = πr²
A of ○ = π(1.4)²
A of ○ = 6.1544 (1.96π)
A of D = $\frac{6.1544}{2}$ $\frac{(1.96\pi)}{2}$
A of D = 3.0772 (0.98π)

Entire Area = A of Δ + A of □ + A of D
Entire Area = 3.92 + 21.84 + 3.0772 (0.98π)
Entire Area = 28.8372 cm² OR: 25.76 cm² + 0.98π cm²

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$\frac{1 \text{ cm}}{2 \text{ m}} = \frac{28.8372 \text{ cm}^2}{? \text{ m}^2}$ $\frac{(28.8372)(2)}{1}$

Entire Area = 57.6744 m²

44741

STOP

3 points
Part A: Correct total area showing work.

0 points
Part B: Student attempts conversion to m^2 by multiplying the result in part A by 2.

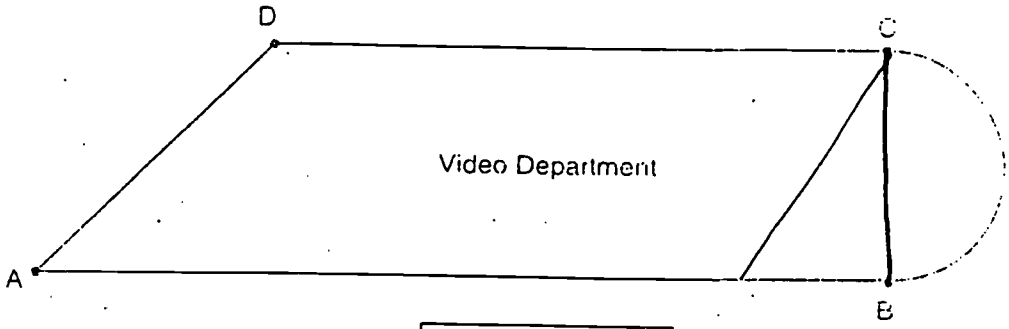
Total score : 3

68

323173

(5 Points)

23 A scale model of the video department in a store is shown below. This department is made up of 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of the ruler. Your answer may be left in terms of π.)

$\overline{DC} = 8cm = 16m$ 162
$\overline{AD} = 4.5cm = 9m$
$\overline{AB} = 11cm = 22m$
$\overline{CB} = 3cm = 6m$

$A = \frac{\pi r^2}{2}$

$A\Delta = \frac{\pi(3)^2}{2}$ $A\Delta = \frac{9\pi}{2}$

$A\Delta = \frac{1}{2} \cdot 3 \cdot 3 = 4.5$

$A(par.) = 8 \cdot 4.5 = 36$

$\frac{9\pi}{2} + \frac{40.5}{1}\left(\frac{2}{2}\right)$

$\frac{9\pi}{2} + \frac{81}{2} = \frac{90\pi}{2} = \boxed{45\pi}$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$A = \frac{\pi r^2}{2}$ $A = \frac{36\pi}{2}$

$\frac{36\pi}{2} + \frac{162}{1}\left(\frac{2}{2}\right) =$

$A\Delta = \frac{1}{2} \cdot 6 \cdot 6 = 18$

$A(par.) = 16 \cdot 9 = 144$

$\frac{36\pi}{2} + \frac{324}{2} = \frac{360\pi}{2} =$

$\boxed{180\pi m^2}$

1 point

Part A: Student divides the figure into a semicircle, a triangle, and a parallelogram. Only the area of the triangle is correct (1 of 3 correct areas).

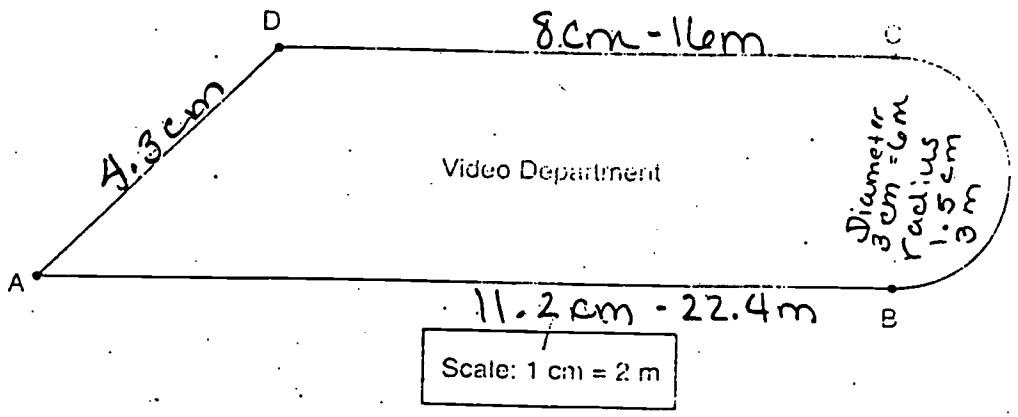
2 points

Part B: Student multiplies all dimensions by two, correctly resulting in an area 4 times that in part A, so conversion is correct. Student repeats the errors from part A, but is not punished twice for the same error.

Total score : 3

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bounded by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

(A,D) 8.6
(D,C) 16
(A,B) 22.4
-1

$A = \frac{1}{2}$(sum of bases) x height + $\pi r^2 \cdot 2$

$A = \frac{1}{2}(19.2) \times 3 + \pi r^2 \cdot 2$

$A = 28.8\ cm^2 + 1.5\ \pi\ cm^2 \cdot 2$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$A = \frac{1}{2}$(sum of bases) x height + $\pi r^2 \cdot 2$

$A = \frac{1}{2}(38.4) \times 3 + \pi r^2 \cdot 2$

$A = 57.6m + 1.5\ \pi\ cm^2 \cdot 2$

2 points

Part A: Student divides the figure into a trapezoid and a semicircle. The area of the trapezoid is correct.

0 points

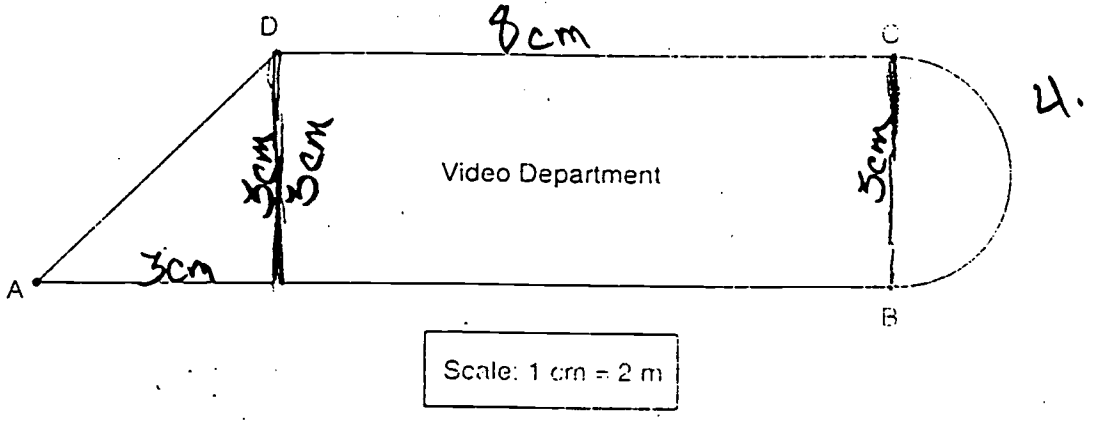
Part B: Student multiplies the bases of the trapezoids by 2, but not the height. Student fails to multiply the radius of the semicircle by 2.

Total score : 2

GIC

(5 Points)

23 A scale model of the video department in a store is shown below. This department is formed by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

Circle
$3.14 \cdot 3 \div 2 = 4.71$

Rectangle
$8 \cdot 3 = 24$

Triangle
$.5 \cdot 3 \cdot 3 = 4.5$

$4.71 + 24 + 4.5 =$
$33.21 \text{ cm}.$

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$33.21 \text{ cm} \cdot 2\text{m} = 66.42 \text{ m}$

2 points

Part A: Student divides the figure into a semicircle, a rectangle, and a triangle. The area of the semicircle is incorrect (2 of 3 correct areas).

0 points

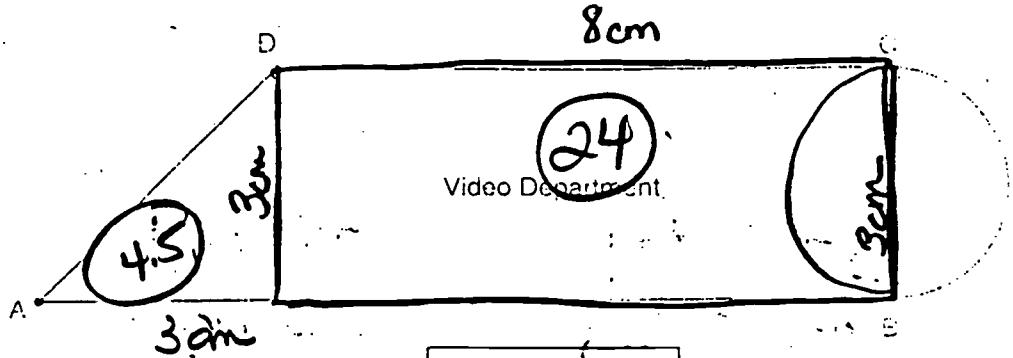
Part B: Student attempts conversion to m^2 by multiplying the result in part A by 2.

Total score : 2

G11

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bounded by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of the ruler. Your answer may be left in terms of π.)

A of Δ = $\frac{1}{2}(b)\cdot h$

$.5(3)\cdot 3$

4.5

A of Rectangle $L \cdot W$

$8 \cdot 3 = 24$

Area of Circle πr^2

$\pi(1.5)^2$

2.25π

$4.5 + 24 + 2.25\pi = 30.75\pi \text{ cm}$

$61.5\pi \text{ m}^2$

B Using the scale in the diagram above, what is the area of the entire video department to the nearest m²? Provide the work that shows how you arrived at your answer.

$61.5 \cdot \pi =$

$2(30.75\pi \text{ cm})$ 193.2079

$61.5\pi \text{ m}^2$

$\approx 193 \text{ m}^2$

2 points

Part A: Student divides the figure into a semicircle, a rectangle, and a triangle. Student uses the area of the circle instead of the semicircle (2 of 3 correct areas). Student attempts to combine unlike terms.

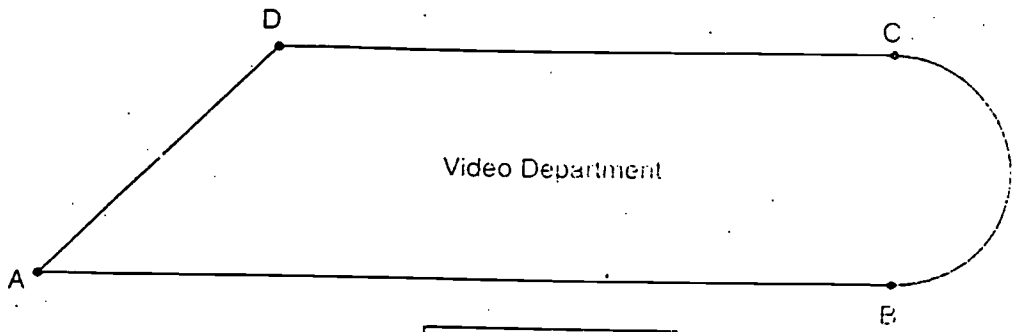
0 points

Part B: Student attempts conversion to m^2 by multiplying the result in part A by 2.

Total score : 2

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

$\overline{AB}$ = 11cm = 22m

$\overline{AD}$ = 4cm = 8m

$\overline{DC}$ = 8cm = 16m

$\overline{CB}$ = 5cm = 10m

28 cm²

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

22m
8m
16m
+10m
56m²

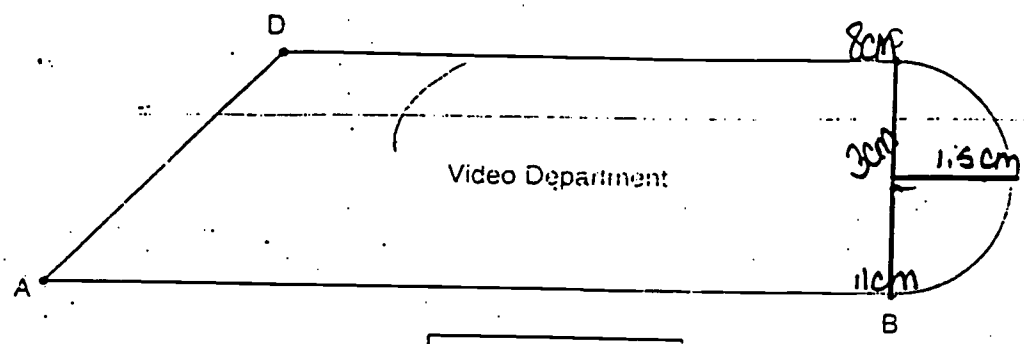
0 points
Part A: Student attempts to find the perimeter of the figure.

1 point
Part B: Student again attempts to find the perimeter. The measurements of each segment are correctly doubled (partial understanding).

Total score : 1

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

8 trapezoid 8cm + 11cm = 19cm

19cm × 3cm = 57cm = area

circle 3.14 · (1.5²) = 2.25

π = 3.14 · 2.25 = 7.065

r = 1.5

area of circle = 7.065 cm

area of trapezoid = 57cm

7.065
+ 57
64.065

Video department area = 64.065 cm

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that shows how you arrived at your answer.

1 point

Part A: Student attempts to divide the figure into smaller figures and sum the areas of the smaller figures. This is part of the correct process (partial setup). Areas are incorrect.

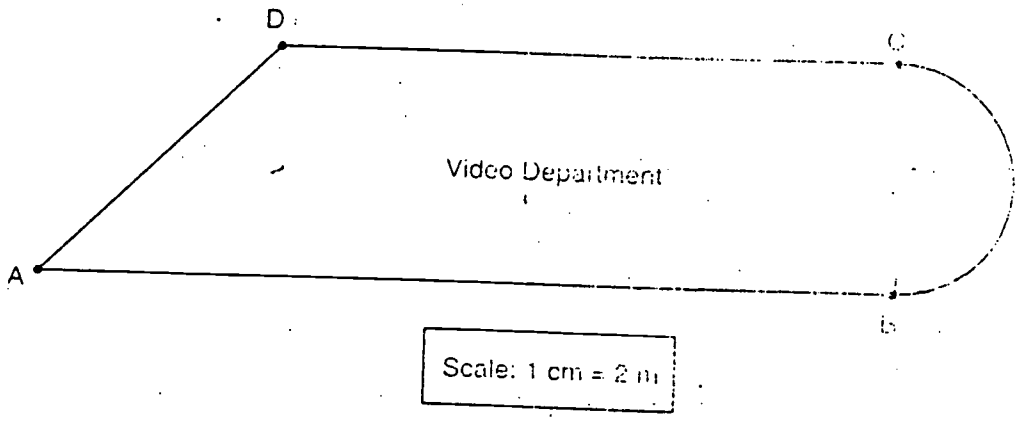
0 points

Part B: No attempt.

Total score : 1

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm^2. Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

rectangle = $3_{cm} \times 8_{cm} = 11cm^2$

triangle = $1.5_{cm} \times 3cm = 4.5cm^2$

semicircle = $1.5_{cm} \times \pi = 9.14$

121cm
20.25cm
141.25cm
22.09cm
163.34cm

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m^2? Provide the work that shows how you arrived at your answer.

$163.34cm \times 2 = 326.68m$

$326.68^2 = 106719.82\ m^2$

G14b

1 point

Part A: Student divides the figure into a rectangle, a triangle, and a semicircle. The area of the triangle is correct (1 of 3 correct areas). Student then adds the squares of these areas.

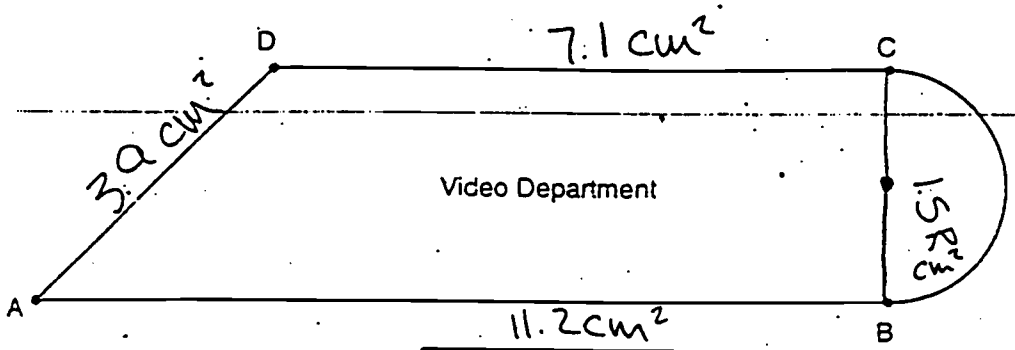
0 points

Part B: Student attempts conversion to m^2 by multiplying the result in part A by 2 and then squaring this result.

Total score : 1

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



Scale: 1 cm = 2 m

A Compute the area of the entire scale model drawing to the nearest cm². Provide the work that shows how you arrived at your answer. Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.

S.A sphere = 14.13

Area = 36.33cm² 3.9 + 11.2 + 7.1 + 1.5 = 36.33

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m²? Provide the work that you completed to arrive at your answer.

36.33 ÷ 2 = 18.165

18.165

0 points
Part A: Student attempts to find the perimeter.

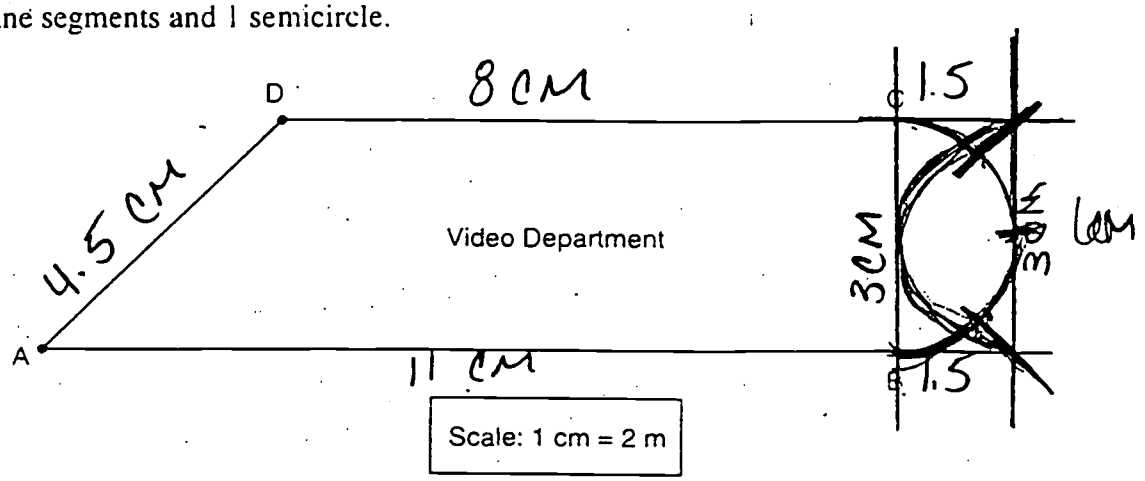
0 points
Part B: Student attempts conversion to m² by dividing the result in part A by 2.

Total score : 0

29.5 cm

(5 Points)

23 A scale model of the video department in a store is shown below. This department is bordered by 3 line segments and 1 semicircle.



A Compute the area of the entire scale model drawing to the nearest cm^2. Provide the work that shows how you arrived at your answer. (Be sure to use the centimeter side of your ruler. Your answer may be left in terms of π.)

It is impossible for me to reach an answer. The distance from point C to point B is a semi-circle. The ruler does not follow a circular pattern. It only measures straight lines. For me to get the actual measurements, I would have to somehow break apart the lines, which is impossible to do.

B Using the scale in the diagram above, what is the area of the actual video department to the nearest m^2? Provide the work that shows how you arrived at your answer.

Since I could not reach an answer for part A, it is again impossible to reach an answer for part B. The only way I could get either answer is to have a straight line. Besides, the department can not have walls that curve.

G16b

0 points
Part A and Part B: Student explains why the problem is impossible from his/her viewpoint.

Total score : 0

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